pressure; or (c) (i) alternatively, mixing the ginsenosides extract with ethanol; (ii) mixing the extract and ethanol with alkali-metal alcoholates solution to produce a mixture, and (iii) placing the resultant mixture in a reaction tank so that the resultant mixture can undergo chemical reactions under required high temperature and high pressure; (d) after the reaction is completed, collecting an intermediate product of a mix of gensenosides and sapogenins from the ethanol mixture; and (e) separating the desired sapogenins from the intermediate saponin-sapogenin mixture by silica-gel-column chromatography.

[0021] The alkali metal can be potassium or sodium. The hydroxide can be sodium hydroxide or potassium hydroxide. The alkali-metal alcoholates solution or the concentration of hydroxide-ethanol solution can be 5~50% (W/V). The alcohol can have 1~5 carbon atoms. The temperature of the reaction tank can be between 150~300°C and the reaction pressure can be between 2.5~8.4 MPa.

DRAWINGS

[0022] In drawings which illustrate specific embodiments of the invention, but which should not be construed as restricting the spirit or scope of the invention in any way:

[0023] Figure 1 illustrates a graph of tumor inhibiting effect of various ginsenosides on B16 cells.

[0024] Figure 2 illustrates a graph of tumor inhibiting effect of various ginsenosides on drug resistant human breast cancer cells MCF7r.

[0025] Figure 3 illustrates a plot of the synergistic effect of PAM-120 with cisplatin on drug resistant human breast cancer cells MCF7r.

[0026] Figure 4 illustrates a plot of the synergistic effect of PAM-120 with taxol on drug resistant human breast cancer cells MCF7r.

[0027] Figure 5 illustrates a graph of the therapeutic effect of PAM-120 on mouse intracranial human malignant glioma (U87) model.

[0028] Figure 6 illustrates a graph of the therapeutic effect of PAM-120 on mouse subcutaneous human malignant glioma (U87) model.

[0029] Figure 7 illustrates a flow chart of two processes which can be used to obtain the sapogenins according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0030] Throughout the following description, specific details are set forth in order to provide a more thorough understanding of the invention. However, the invention may be practiced without these particulars. In other instances, well known elements have not been shown or described in detail to avoid unnecessarily obscuring the invention. Accordingly, the specification and drawings are to be regarded in an illustrative, rather than a restrictive, sense.

[0031] This invention relates to a physically obtained group of novel compounds as follows:

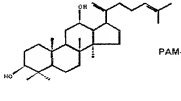
- Dammara-20(21)-diene-3,12-diol (named as PAM-120);
- Dammara-20(22E)-diene-3,12,24-triol (named as PBM-100);
- Dammara-2-(22E)-diene-3,6,12-triol (named as PBM-110);
- 3-0-β-D-glucopyranosyl-dammara-20(21)-diene-3,12-diol (named as PAN-20); and
- 3-0-[β-D-glucopyranosyl(1→2)-β-D-glucopyranosyl]-dammara-20(22E)-diene-3,12-diol (named as PAN-30).

[0032] The chemical formulas, structures and spectrum characteristics of the above listed novel compounds are shown on the following pages:

Sapogenin PAM-120

Dammara-20(21)-diene-3,12-diol (named as PAM-120)

(1) Structural formula:



PAM-120

(2) Molecular formula: $C_{30}H_{50}O_2$

(3) Molecular weight: 442.723

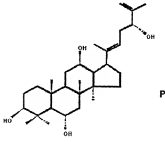
(4) The ^{1}H-NMR spectrum (300 MHz, C_5D_5N) has shown signals at δ5.28 (1H, br.t), δ5.14 (1H, s), δ4.90 (1H, s), δ1.67 (3H, s), δ1.60 (3H, s), δ1.23 (3H, s), δ1.06 (3H, s), δ1.03 (3H, s), δ0.95 (3H, s) and δ0.90 (3H, s).

(5) The ^{13}C-NMR spectrum (75.4 MHz, C_5D_5N) has shown signals at δ39.57 (C-1), δ28.31 (C-2), δ78.02 (C-3), δ40.30 (C-4), δ56.46 (C-5), δ18.84 (C-6), δ35.46 (C-7), δ37.53 (C-8), δ51.03 (C-9), δ39.61 (C-10), δ32.76 (C-11), δ72.51 (C-12), δ48.29 (C-13), δ51.27 (C-14), δ32.68 (C-15), δ27.12 (C-16), δ52.51 (C-17), δ15.91 (C-18), δ16.61 (C-19), δ155.57 (C-20), δ108.18 (C-21), δ33.91 (C-22), δ30.82 (C-23), δ125.38 (C-24), δ131.24 (C-25), δ25.81 (C-26), δ17.81 (C-27), δ28.73 (C-28), δ16.34 (C-29) and δ17.06 (C-30).

Sapogenin PBM-100

Dammara-20(22E)-diene-3,12,24-triol (named as PBM-100)

(1) Structural formula:



PBM-100

(2) Molecular formula: $C_{30}H_{50}O_4$

(3) Molecular weight: 474.721

(4) The ^{1}H-NMR spectrum (300 MHz, C_5D_5N) has shown signals at δ5.31 (1H, br.t), δ5.22 (1H, s), δ4.82 (1H, s), δ1.95 (3H, s), δ1.81 (3H, s), δ1.66 (3H, s), δ1.64 (3H, s), δ1.47 (3H, s), δ1.19 (3H, s), δ1.06 (3H, s) and δ1.03 (3H, s).

(5) The ^{13}C-NMR spectrum (75.4 MHz, C_5D_5N) has shown signals at δ39.48 (C-1), δ27.52 (C-2), δ78.48 (C-3), δ40.42 (C-4), δ61.86 (C-5), δ67.77 (C-